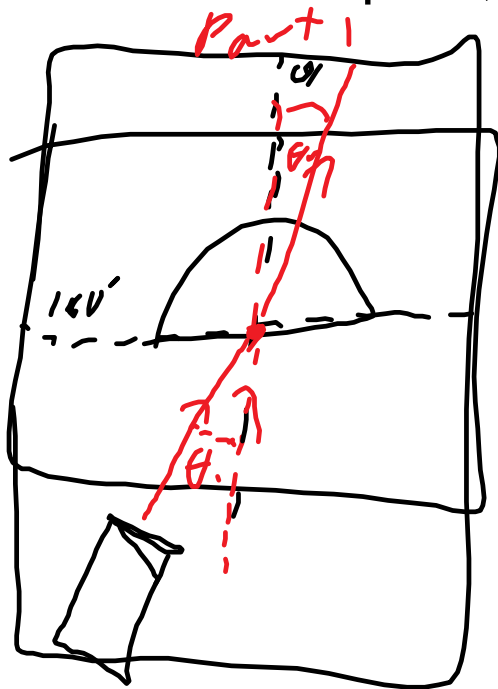


Refraction Lab

refer to labbook p 45,46



θ_i	θ_r	$\sin \theta_i$	$\sin \theta_r$	$\frac{\sin \theta_i}{\sin \theta_r}$	Comment

Quiz

1. $v = \lambda f$ $f = 1/T = 1/0.02 = 50.0 \text{ Hz}$

$$\lambda = 343 \text{ m/s} / 50 \text{ Hz} = 343/50 = 6.86 \text{ m}$$

$$\text{or } 343/25 = 13.72 \text{ m}$$

2.

aa) $d = vt$ $t = \text{echo}/2$ $d = 1500 \times 0.2/2 = 150 \text{ m}$ or 225 m

b) if the frequency is higher, think neeeeeeyaow
the submarine is moving towards the ship

$$f = f'(v + v_o)/(v - v_s) \text{ set } v_o = v_s = x$$

$$445 = 440(1500 + x)/(1500 - x)$$

$$x = 17 \text{ m/s}$$

3.

a) closed pipe is closed at one end so there is a
node and anti-node at each end. $L = \lambda/4$ for the
fundamental frequency (general equation

$$L = (2N - 1)\lambda/4) \quad v = \lambda f \text{ so } L = v/4f = 343/(4 \times 350) =$$
$$0.245 \text{ or } 0.34 \text{ m}$$

b) incoming waves interfere constructively with
the reflected waves (reflect off the bottom and
off the open end)

$$4. \lambda = v/f = 339/256 = 1.3242 \text{ m} \quad L = 1.3242/2 =$$
$$0.6621 \quad \text{if that tube goes to Vancouver}$$

$$f = v/\lambda = 343/1.3242 = 259.0243$$

you will hear 3.0 Hz beats between the
instruments and the resulting tone will be
sharp.

(other quiz, 5.0 Hz beats)

